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Monday, 15 November 1976
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SUSQUEHANNA RIVER BASIN FLOOD CONTROL REVIEW STUDY

PUBLIC MEETING / WORKSHOP

DEPARTMENT OF THE ARMY
BALTIMORE DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1715
BALTIMORE, MARYLAND 21203

NABPL-F

17 September 1976

TO ALL CONCERNED OFFICIALS AND THE PUBLIC

I would like to take this opportunity to invite all interested parties to a workshop and public meeting concerning the Corps of Engineers' Susquehanna River Basin Flood Control Review Study. The sessions will be held in Harrisburg, Pennsylvania, on Monday, 15 November 1976 in the Student Center, Harrisburg Area Community College, from 1:30 p.m. to 4:30 p.m. and from 7:30 p.m. to 11:00 p.m respectively. Because of the size of the Susquehanna River Basin, similar meetings are being held at three other locations. The area of discussion for this meeting is shown on Figure 1.

The Baltimore District, Corps of Engineers, has been conducting the Susquehanna River Basin Flood Control Review Study for several years. Currently, the study is at a stage where identification has been made of potential Federal flood control projects which, at this time, appear to be feasible. It is important to inform and obtain feedback from the public so the concerns and issues raised can be incorporated into the next and final stage of the study. A final public meeting will be held at a later date to present the results of the study.

All those interested are urged to be present or represented at the afternoon workshop that will be conducted on an informal basis. Members of my staff will be available at this session to discuss details of our study activities concerning:

1. Reservoirs
2. Local Flood Protection
3. Flood Forecast and Warning
4. Harrisburg Local Flood Protection Study

This session will provide you with the best opportunity to have a free exchange of ideas, ask questions, and make comments on the various activities.

United States. Army. Corps
of Engineers. Baltimore
Susquehanna River Basin

The evening public meeting will start with a brief overview of the various study results. Following this, it is planned to have individual discussion groups similar to the afternoon session for discussion of each of the flood control activities listed above. This will enable the attendees to obtain details on a subject which is of particular interest to them. The session will be formally reconvened after one hour of the group discussions. At that time, all parties will be afforded full opportunity to express their views and bring specific data on matters pertinent to the study. Statements should be supported by factual information insofar as possible.

During the evening meeting, oral statements will be heard, but for accuracy of record, it is suggested that all important facts and statements be submitted in writing. Written statements may be handed to the presiding officer at the meeting or mailed beforehand to the Corps of Engineers' address above. Statements so mailed should indicate that they are in response to this announcement. All statements, both oral and written, will become part of the Corps of Engineers' official record of this study and will be made available for public examination. Supplementary comments submitted within two weeks following the meeting will also be included in the record of the meeting.

Please bring this announcement to the attention of anyone who may have not received a copy or anyone you may know who would be interested in this matter.

John H. Kenworthy

JOHN H. KENWORTHY
LTC, Corps of Engineers
Acting District Engineer

DESCRIPTION OF THE STUDY

Following the devastation resulting from Tropical Storm Agnes in June 1972, the Corps of Engineers was directed to conduct a Flood Control Review Study of the Susquehanna River Basin. The purpose of the study is to determine if any improvements or additions to the existing Federal flood control system would be feasible as Federal projects.

For a flood protection plan to be considered as a Federal project it must meet several conditions, the most limiting of which is economic justification. A project is considered to be economically justified if the benefits (largely flood damage reductions) equal or exceed the total cost of the project. Other qualifying conditions include engineering feasibility, environmental and social acceptability, and local support.

An evaluation is being made of all potential flood locations in the basin. This evaluation will determine (1) the severity of potential flood damage that exists, (2) if any of the flood damage reduction alternatives considered will effectively reduce damage, and (3) whether any of the effective alternatives would qualify as a Federal project.

The types of flood damage reduction alternatives being considered fall into two general categories, those which affect a region and those that affect only a single location. These alternatives are categorized below. Each will be discussed later in some detail.

Regional
Reservoirs
Flood Forecasting
and Warning

Local
Levees and/or Floodwalls
Channel Modification
Relocation
Floodproofing
Raising
Small Upstream Reservoirs

The Flood Control Review Study will be complete when all projects that appear to have potential for Federal implementation have been identified. The result of the study will be recommendations for detailed survey studies of these projects. If these detailed studies indicate continued economic, engineering, and environmental feasibility of the project and it has local support, the Corps of Engineers would submit a recommendation to the Congress for authorization of a project.

STUDY PROGRESS

The major efforts since the beginning of the study have concentrated on preliminary evaluation of the feasibility of flood damage reduction alternatives for all locations in the basin. The major objective of the analysis

has been to determine if any of these alternatives are economically feasible. Only if this condition is met can a project be considered for a favorable recommendation.

Initially, the alternatives have been evaluated using a minimal amount of detail so that those having possible economic feasibility could be quickly recognized without collecting voluminous data. Different techniques have been used in the investigation of the various alternatives. The early identification of favorable areas allows a concentration of studies in these areas and preparation of more detailed analyses. When it has been determined that a location has no economically feasible alternatives, that location is dropped from further considerations. Projects having a benefit/cost ratio greater than 0.5 are being considered in more detail.

To date, local alternatives have been evaluated for 87 communities in the portion of the basin of concern at this meeting. No economically justified levee, floodwall or channel modification projects were identified in this portion of the basin. The four communities listed below are being studied in more detail to determine if the alternatives of relocation, floodproofing, and/or raising would be economically justified. These communities frequently have significant damages of the type which could be reduced by these alternatives.

Twenty-two major reservoir sites have been evaluated, nine of which are still under consideration. Some details on the costs and benefits for these are shown in Table 1. When evaluating reservoirs, the initial concern was the flood control potential. The sites found to have the most potential for flood control are presently being evaluated as multipurpose projects.

Flood forecasting and warning, the other regional alternative, is presently being assessed for the entire basin. A study has been initiated which consists of the following components: (1) identification and description of the existing system, (2) formulation of the best system of data collection equipment, (3) develop a plan for automatic collection, and (4) development of a plan for dissemination of the forecast to the affected public. The first two components of this study have been completed.

Local

Relocation, Floodproofing and/or Raising - Williamsburg, Huntingdon, Duncan Island, Middletown

Small Upstream Reservoirs - Preliminary evaluations not yet complete.

DESCRIPTION OF ALTERNATIVES

Regional

Reservoirs

Major reservoirs in the Susquehanna River Basin are usually located on the main stem of a river or a major tributary and constructed by the Corps of Engineers.

Generally, these reservoirs have a storage volume greater than 25,000 acre-feet and have regulated outlet works which provide control of the flow discharged from the reservoir. A major reservoir, because of its large size, offers opportunities for water supply, water quality management, recreation, fish and wildlife conservation as well as flood control. Major reservoirs require large areas of land which may be in agricultural production or the location of rural communities which would require relocation.

Flood Forecasting and Warning

Flood forecasting and warning is an intregal part of any system of flood damage reduction measures. This measure consists of two separate activities. The first is the preparation of the forecast of peak river stages. This may be done by either the National Weather Service or a local self-help flood warning committee. The second is the dissemination of the warning for a coming flood to the affected public.

Although both components are extremely important, the second is essential in reducing flood damages and preventing the loss of life. These actions must be carefully planned in advance so they may be implemented effectively.

Local Alternatives

Levees and Floodwalls

Levees and floodwalls are similar flood control measures that provide protection by confining flood flow within a given area. Levees are earthen embankments which require more area than do reinforced concrete floodwalls. These measures are effective in reducing damages in the local area behind them from floods not exceeding those for which they are designed. When a flood greater than this occurs and the levees or floodwalls are overtopped, resulting damages can be immense. Generally, the Corps strives to provide as high a degree of protection as economically feasible.

Channel Modification

Channel modification consists of a number of different techniques used singly or in combination. These are the removal of material from the channel to provide an enlarged area for the flow of the river, straightening of the channel, and clearing of overbank areas to allow for more efficient flow conditions. These modifications allow a given volume of flow to pass a given area at a reduced flood height.

Channel modification is most effective on small streams because the increase in channel capacity is more easily achieved. Generally, this method provides a relatively low degree of flood protection. Sediment deposits must be removed periodically to maintain the channel dimensions and the effectiveness of the project.

Relocation/Evacuation

Relocation/evacuation is still another means of preventing flood damage. It consists of the permanent removal of buildings and other structures from a flood-vulnerable area. This generally involves purchasing the flood vulnerable land, demolishing or otherwise removing the buildings and other structures, cleaning up the debris, and landscaping the area. New sites are provided for those structures which can be physically relocated. The necessary transportation facilities and utilities and such amenities as landscaping are also furnished.

When the buildings cannot be moved to a new site, they are purchased so that the owners can purchase replacement buildings out of the flood plain. This is costly, making this method of flood damage reduction attractive only where the extent of development is small and the area is frequently flooded.

Floodproofing

Floodproofing is a combination of structural changes and adjustments to properties subject to flooding, primarily for the reduction or elimination of flood damages. Although it is easier and cheaper to apply it to new construction, floodproofing is also applicable to some existing buildings.

Floodproofing measures fall into three broad categories. First, there are permanent measures, such as constructing a new building so that its lowest occupied floor is raised above flood level or placing mechanical equipment on upper floors in an existing structure. A waterproof cell which could be constructed in the basement to protect major utilities in an existing structure is another permanent measure.

Second, there are standby measures. These are used only during a flood but are made ready for use prior to the flood. Special waterproof coverings for wall openings are an example of this type of floodproofing. And third, there are those emergency measures which are carried out during a flood or in anticipation of it. These would include the sandbagging of doors and window openings in order to prevent the entrance of flood waters.

Floodproofing does, however, have its limitations. While it can reduce interior damages substantially, exterior damages to individual buildings and the overall flooded area will occur. Also, floodproofing can bring about a false sense of security which could discourage the development of needed flood protection works or the timely evacuation of the flood plain. This sense of security may lead to an increase in the use of flood plains. Most important of all, if applied to a structurally inadequate building, it can result in more damage than would occur if the building were not floodproofed.

Raising

This measure consists of raising residential type structures so that the first floor level is above the flood level. The

majority of the damages to the structure from a smaller flood are prevented. However, a flood of greater magnitude than the design flood would still cause damages to both structure and contents. A maximum raising of six feet was evaluated as part of this study.

Small Upstream Reservoirs

Upstream reservoirs are situated on small tributaries to the main stem of the river. They are usually constructed by the Soil Conservation Service or an individual state. These reservoirs are highly effective in reducing flood damages along the streams on which they are located. But along the main stem of the river, their effect is limited.

There are some disadvantages presented by this type of reservoir. First, they only control a small area of the total area drained by the river system. Consequently, a large system of small reservoirs is required before any appreciable effect on flood flows in the main portion of the river can be measured. Second, small reservoirs generally do not have gates which can be operated to control when the water from the reservoir is released. And third, the water storage provided by the reservoir replaces most of the storage in the tributary flood plain. Thus, the actual additional storage provided is often considerably smaller than it appears.

FUTURE WORK

The projected completion date for the Susquehanna River Basin Flood Control Review Study is September 1977. The study's remaining work efforts are concerned with the continued investigation of alternatives at those locations identified as having potential for Federal implementation. Work in the section of the basin discussed at this meeting will be concentrated on those four local projects and seven reservoir alternatives which appear to be potentially economically feasible, and on the flood forecasting and warning system evaluation.

Further studies of the local alternatives will consist of a detailed review to assure accuracy of the presently completed evaluations. This will be followed by consideration of combinations of different alternatives, allowing for the identification of the most economically justified and efficient combination. Finally, a plan which will include input from local interests and consideration of environmental and socio-economic impacts will be formulated. Further studies of the reservoir alternatives will concentrate on the evaluation of them for purposes other than flood control. These other purposes could include hydroelectic power generation, water supply, and recreation. These reservoirs, when evaluated using flood control as their sole purpose, are found to lack the required economic justification. However, it is possible that by including other purposes, an economically justified project could result.

The work on the flood forecasting and warning alternative will involve the completion of the remaining two components of the study described under Study Progress. The fourth component will include extensive coordination with the public to determine how best to accomplish efficient flood forecasting and warning.

The last step in this study will be the preparation of the final report. This report will contain the results of the study and technical material supporting the conclusions. Also planned for inclusion is a section which will be extremely useful to community leaders and planners in solving their own flood problems. This section will contain for all locations evaluated, the results of those evaluations and a description of what appears to be the most practical alternative for implementation without Federal support.

After a final public meeting to announce the results of the study, the final report will be forwarded for agency review and ultimately to Congress for final action.

OTHER LOCAL CORPS ACTIVITIES

HARRISBURG LOCAL FLOOD PROTECTION SURVEY REPORT

The Survey Report for Local Flood Protection at Harrisburg, Pennsylvania was initiated in 1972 after Tropical Storm Agnes. This storm resulted in flooding from Paxton Creek and the Susquehanna River which inundated the entire business district along Cameron Street. The purpose of the study is to investigate the possibility of providing flood protection to Harrisburg.

ALTERNATIVES UNDERSTUDY

North Harrisburg

One of the alternatives being considered for the protection of North Harrisburg and a portion of Susquehanna Township is a combination floodwall and levee. This scheme would consist of a concrete wall along Front Street from Forster Street north to Miller's Lane in the Lucknow area. From this point, an earthen levee would extend eastward to high ground. Six pumping stations would be placed at intervals along the extent of the structure to discharge internal drainage.

Three different heights of the floodwall and levee combination have been evaluated. Preliminary benefit/cost calculations indicate that none is economically justified. Thus, none is qualified to be considered as a Federal project.

Additional alternatives considered for North Harrisburg included relocation/evacuation of the floodplain, channel diversion, channel improvement, and floodproofing. The high value of land and improvements in flood prone sections of North Harrisburg make evacuation and relocation impractical and uneconomical.

Channel diversion is not practical because of the lack of a suitable location and the size of channel required.

Hydraulic studies have indicated that channel improvement would not appreciably lower flood stages. The depth of flooding and the degree of development preclude the use of floodproofing and zoning as a complete solution to the flooding problem in North Harrisburg. Flood plain management and flood insurance by the local governing agency and property owners will help to reduce damages in future floods.

South Harrisburg

The study area of South Harrisburg includes the area along the Susquehanna River south of Chestnut Street, and the Paxton Creek Valley from Wildwood Lake to the mouth of the creek. This area suffers from flooding by both Paxton Creek and the Susquehanna River.

Measures are being formulated to protect this area from flooding. These alternatives would be a mixture of several components. Included in these are:

a. A floodwall and levee to protect South Harrisburg from the Susquehanna River (different heights and configurations of this alternative are being considered).

b. An increase in size of all or part of the existing channel of Paxton Creek.

c. Construction across Asylum Run of a detention reservoir with recreational facilities.

d. Different alignments of the Paxton Creek channel.

e. Diversion of all or part of Paxton Creek.

Any alternative for South Harrisburg would include pumping stations to remove interior drainage.

TABLE 1

RESERVOIR

Project	First Cost
Mount Upton	$ 81,500,000
Copes Corner	$ 35,200,000
East Guilford	$ 76,000,000
Great Bend	$ 284,000,000
Genegantslet	$ 30,800,000
Keelersburg	$ 662,000,000
Towanda	$ 43,800,000
Keating	$ 679,000,000
Sinnemahoning	$ 189,000,000

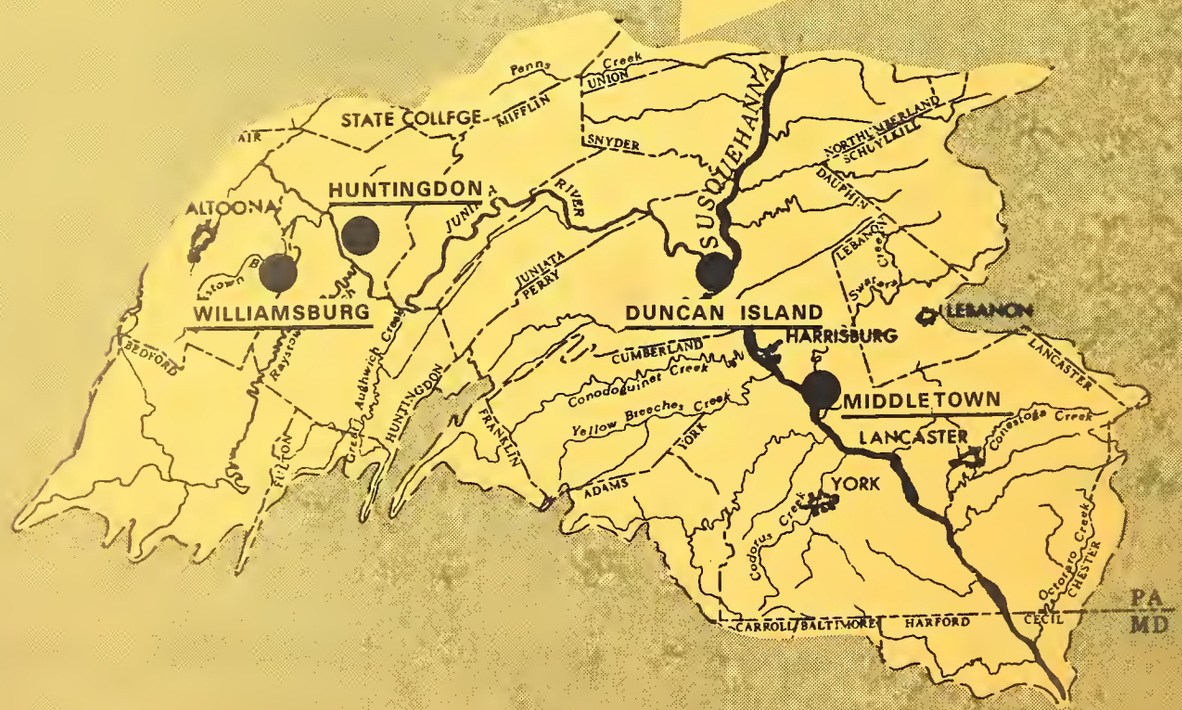
COST DATA

Annual Cost	Benefit/Cost Ratio
$ 5,010,000	0.66
$ 2,160,000	0.71
$ 4,670,000	0.68 1/
$ 17,450,000	0.61
$ 1,890,000	0.79
$ 40,710,000	0.32 1/
$ 2,690,000	0.79
$ 45,700,000	0.86 2/
$ 11,660,000	0.43 1/

1/ Currently being evaluated for hydroelectric power potential.
2/ Includes hydroelectric power as project purpose.

Susquehanna River Basin Flood Control Review Study

LIMIT OF SUBJECT AREA FOR THIS MEETING



● LOCAL ALTERNATIVE

Figure 1

Susquehanna River Basin
Flood Control Review Study

★ EXISTING RESERVOIRS

■ EXISTING LOCAL FLOOD PROTECTION PROJECTS

● RESERVOIRS STILL BEING CONSIDERED

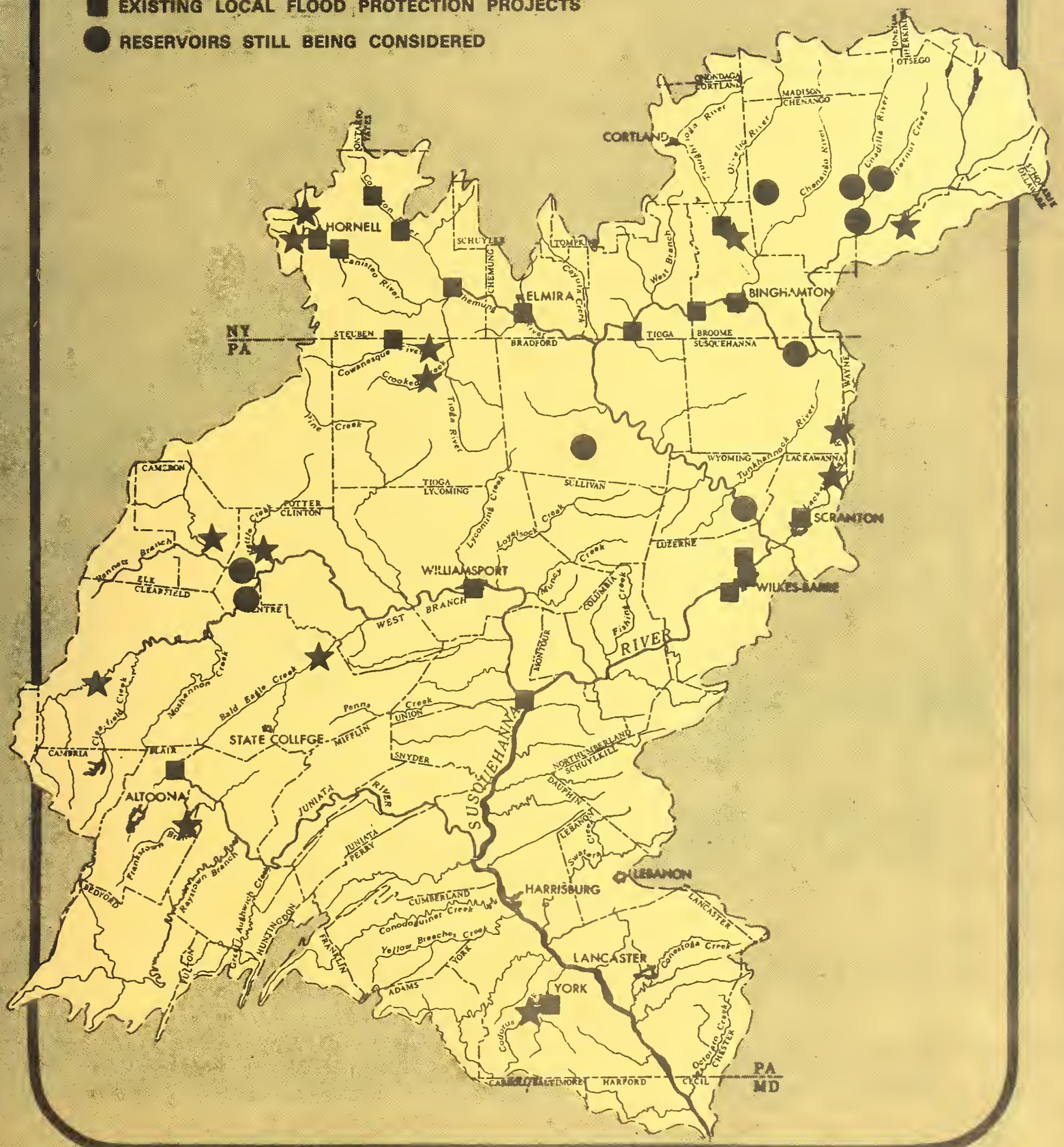
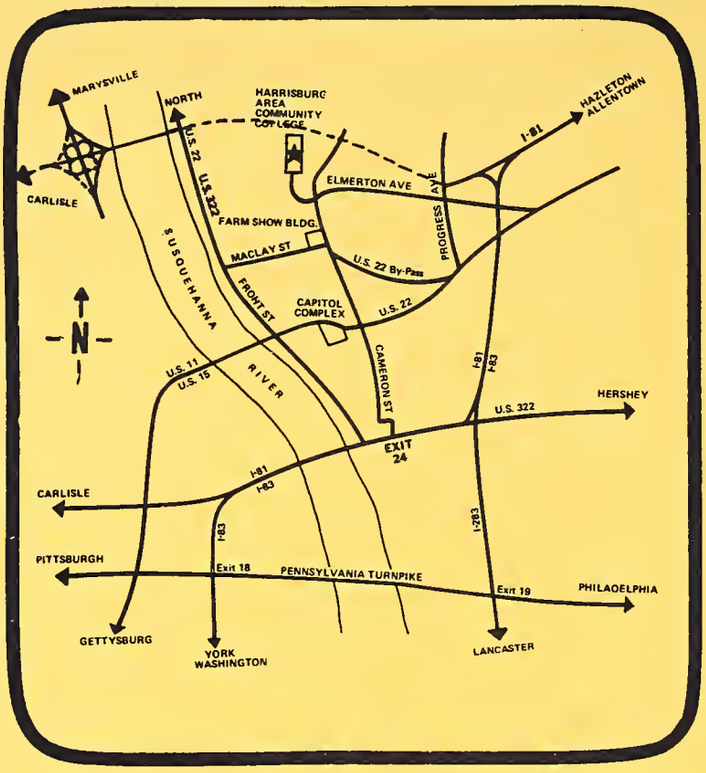
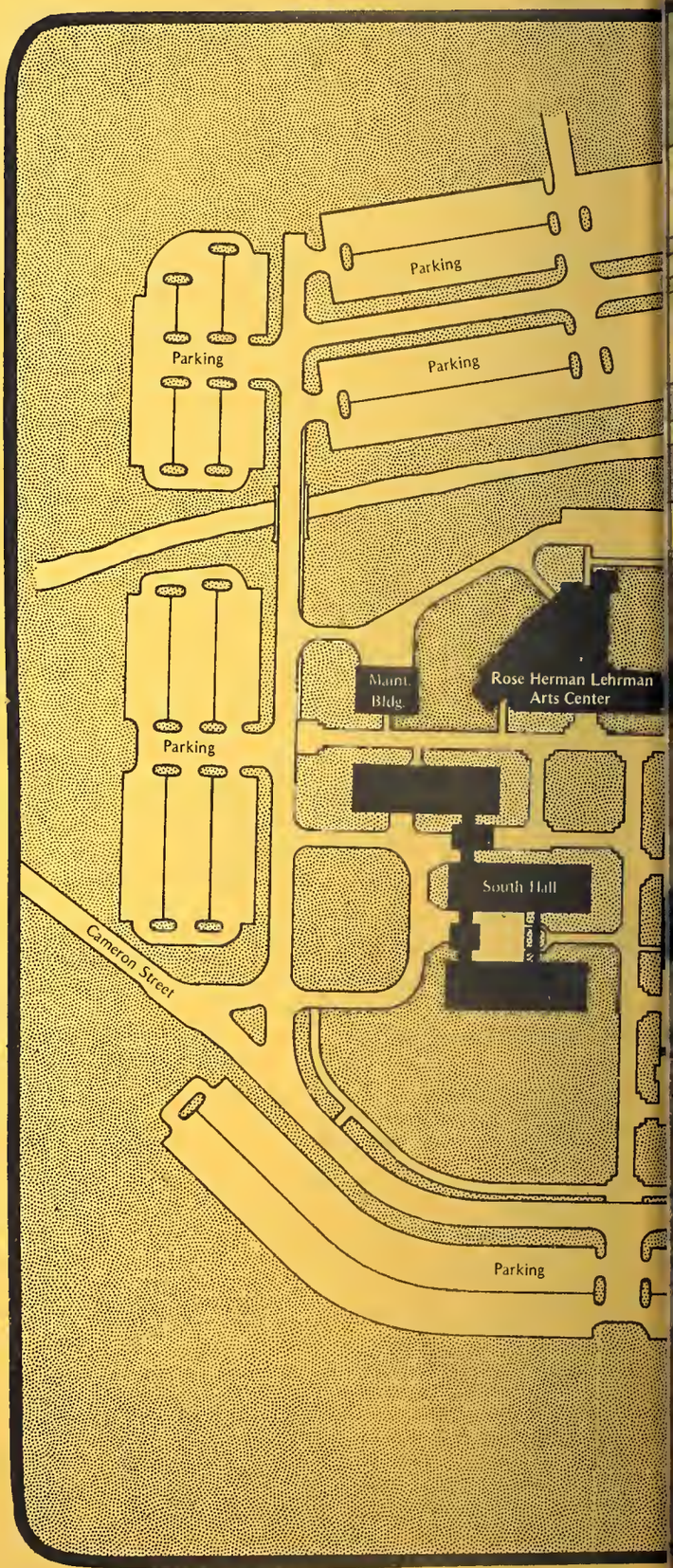
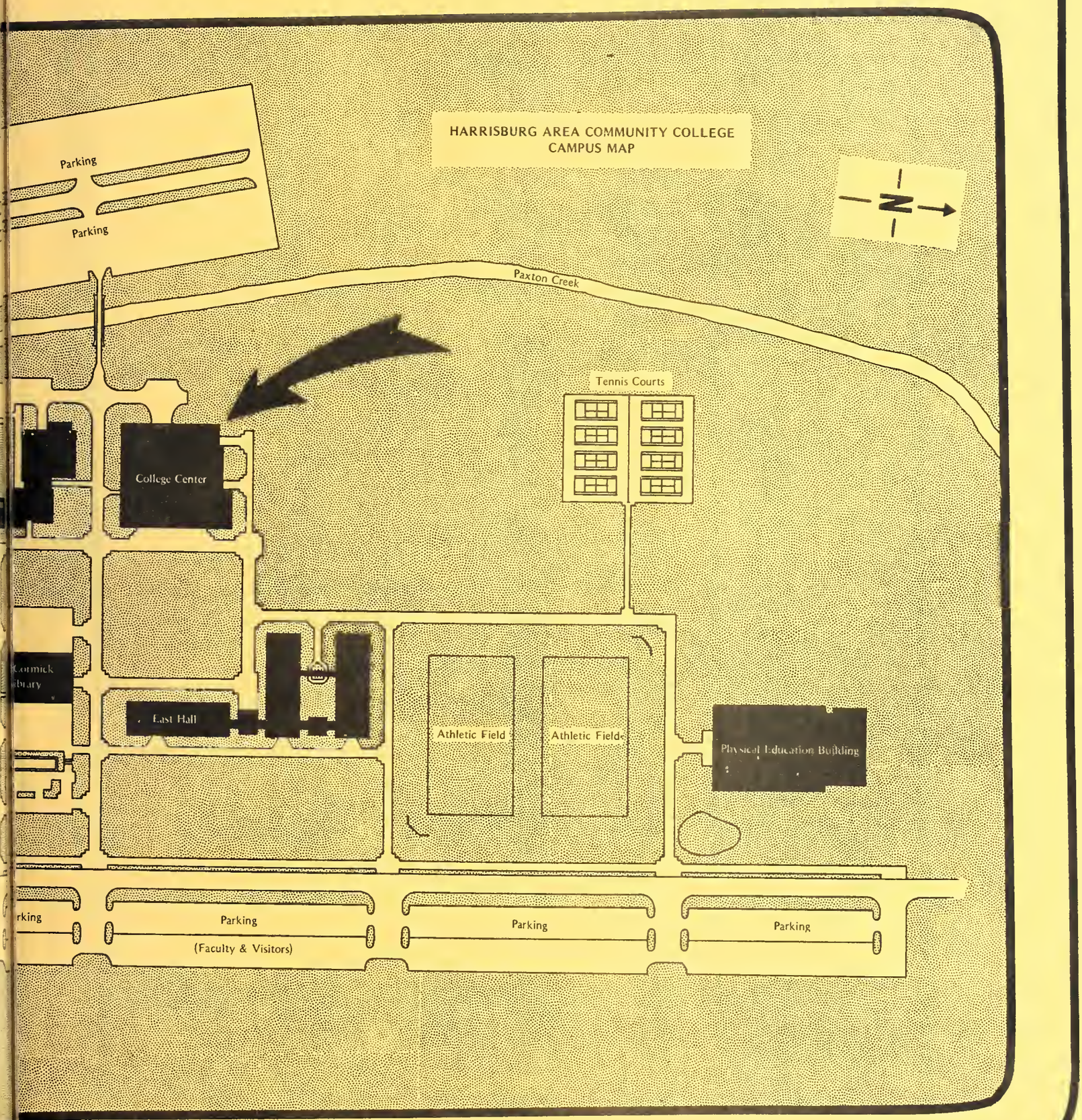


Figure 2





Meeting Location


HARRISBURG AREA COMMUNITY COLLEGE
CAMPUS MAP
N
Parking
Parking
Paxton Creek
Tennis Courts
College Center
East Hall
Athletic Field
Athletic Field
Physical Education Building
Parking
(Faculty & Visitors)
Parking
Parking

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Susquehanna River Basin Flood Control Review Study Public Meeting And Workshop

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